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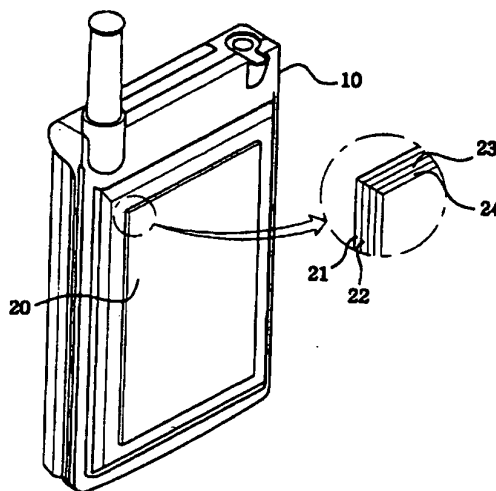
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(54) Title: CONTACTLESS ELECTRONIC CARD



(57) Abstract: Disclosed herein is a contactless electronic card attachable to/ or interposed in a certain position of a portable item or portable terminal. The contactless electronic card includes a loop antenna for communicating with a card reader, an electronic chip for transmitting user identification information stored therein at the request of the card reader, and a ferrite core for canceling interference from electromagnetic waves and a magnetic field while the card is read by the card reader. In accordance with the present invention, a contactless electronic card with a ferrite core for canceling interference from electromagnetic waves and a magnetic field allows the electronic card to be used while being attached to/ or interposed in a portable item such as a portable terminal, thereby improving the portability and convenience thereof and minimizing the risk of loss thereof.

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CONTACTLESS ELECTRONIC CARDTechnical Field

The present invention relates generally to a contactless electronic card, and particularly to a contactless electronic card with a built-in contactless radio frequency electronic chip, which is provided with a ferrite core for canceling interference from electromagnetic waves and a magnetic field, thereby allowing the electronic card to be used while being attached to or enclosed in a portable item or terminal containing an interfering material.

Background Art

Currently, with the rapid growth of the information society based upon credit, card users, such as people and corporations, deeply feel the risk and inconvenience in handling cash. Government authorities promote using cards in business as an economic policy. Therefore, use of various cards in business is rapidly growing.

Examples of conventional cards include various types, from a simple recording medium having a magnetic stripe placed on the backside to record user identification information, up to an Integrated Circuit (IC) card having a built-in Radio Frequency Identification (RFID) electronic chip.

A RFID card 1 having a built-in chip is divided into a contact type card or contactless RFID card. The contactless RFID card 1 is being used as a security card key for regulating entrance and exit, or as a petty-settlement means for paying a small amount of money such as a subway or bus fare. Inside the contactless RFID card 1, there is a loop antenna and RFID electronic chip to communicate with a card reader 2 installed in a specific place. The card reader 2 is adapted to read identification information and purchase information registered in the electronic chip and transmit them to a financial server 4 or security system via communication means 3.

In the RFID card 1 used as a petty-settlement means, a user is primarily provided with a service, and, thereafter, purchase information about the provided service and the unique identification information of the electronic chip enclosed in the RFID card 1 are transmitted to the financial server 4 immediately, or later and manually. At a due date after a certain period of time, the service is paid for as a deferred payment.

Also, the RFID card 1 can be used as a rechargeable card to pay fares for public transportation. The rechargeable RFID card 1 pays the fares by means of charged money information while communicating with the card reader 2, and then stores new settled money information. Thereafter, the user pays a certain amount of money at a charging station having a charging apparatus, and then charges the RFID card 1 with the amount of money, thereby storing new money information in the RFID card 1.

According to the conventional contactless RFID card 1 described above, however, the user separately carries the card, resulting in inconvenience and the risk of loss. Additionally, for the rechargeable RFID card, the user should personally visit the charging station to charge the card with a certain amount of money.

Currently, a security card key and a RFID card for petty-settlement, which are used in a contactless manner in conjunction with the card reader, are generally used while being isolated from interfering materials and thus do not experience interference from electromagnetic waves and a magnetic field. Therefore, electric energy can be transmitted to the electronic chip without any damage or loss.

However, when the RFID card is maintained in a purse or bag containing an interfering material, such as an iron core or a metal piece and they are read by the card reader, user identification information recorded in the RFID card cannot be read due to interference by the interfering material. Additionally, when the loop antenna enclosed in the RFID card is damaged due to cutting or breakage of the RFID card, it is impossible to read the RFID card.

A service, which is provided through the RFID card combined with the portable terminal, is lately under discussion. However, there is a serious

technical problem in reading user identification information due to interference by the interfering materials of the portable terminal including an iron sheet, a circuit, and sheet metals for shielding electromagnetic waves and EMI.

### Disclosure of the Invention

5           Accordingly, the present invention has been made keeping in mind the problems as set forth above, and it is an object of the present invention to provide a contactless electronic card with a ferrite core for canceling interference from electromagnetic waves and a magnetic field, which allows the electronic card to be used while being attached to a portable item such as a portable terminal.

10           Another object of the present invention is to provide a contactless electronic card with a ferrite core for canceling interference from electromagnetic waves and a magnetic field, which allows the electronic card to be used while being disposed between the nonmetallic material constituting the contour of the portable terminal or portable item and the EMI shielding material or device applied  
15           to or mounted on the nonmetallic material.

          In order to accomplish the above object, the present invention provides a contactless electronic card attachable to a certain position of a portable item or portable terminal, comprising: a loop antenna for communicating with a card reader; an electronic chip for transmitting user identification information stored  
20           therein at the request of the card reader; and a ferrite core for canceling interference from electromagnetic waves and a magnetic field while the card is read by the card reader.

          In addition, the present invention provide a contactless electronic card interposed between a nonmetallic material constituting the contour of a portable  
25           item or portable terminal and an electromagnetic interference (EMI) shielding material or device applied to or mounted on the inner face of the nonmetallic material, comprising: a loop antenna for communicating with a card reader; an electronic chip for transmitting user identification information stored therein at the request of the card reader; and a ferrite core for canceling interference from

electromagnetic waves and a magnetic field while the card is read by the card reader.

### Brief Description of the Drawings

5 The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a diagram of a conventional contactless RFID card system;

Figs 2 and 3 show usages of attachable contactless electronic cards in accordance with preferred embodiments of the present invention; and

10 Figs 4 to Figs 6 show usages of a built-in type contactless electronic card in accordance with other preferred embodiment of the present invention.

### Best Mode for Carrying Out the Invention

Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components.

15 Figs. 2 and 3 show usages of an attachable contactless electronic card in accordance with preferred embodiments of the present invention.

The contactless electronic card 20 shown in Fig. 2, is used while being freely attached to a random position on a portable terminal such as a mobile phone, a PDA (personal digital assistant) or an IMT (International Mobile Telecommunication)-2000 terminal, that is, the front face of the folder of a portable terminal 10 or the outer face of a battery assembled to the back face of the portable terminal 10.

25 The electronic card 20 comprises a loop antenna and electronic chip 23 for communicating with a card reader 2 mounted on a subway train or bus and transmitting user identification information stored therein at the request of the card reader 2, and a ferrite core 22 composed of iron oxide ( $\text{Fe}_2\text{O}_4$ ) and an oxide of

metal such as Mn, Zn, or the like for canceling interference from electromagnetic waves and a magnetic field while the electromagnetic card 20 is read.

The electronic card 20 can be also used while being attached to an electronic notebook, a portable computer, and a wristwatch.

5           The electronic card 20 has an adhesive layer 21 on its back face for applying itself to a position on the portable terminal 10. A ferrite core 22 for canceling interference from electromagnetic waves and a magnetic field is positioned on the adhesive layer 21, and a loop antenna and electronic chip 23 is provided on the ferrite core 22. Finally, in the outside portion of the electronic  
10 card is provided a coating layer 24 printed with an image advertisement of a credit card company.

          The loop antenna and electronic chip 23 is provided on the ferrite core 22 in the card for the convenience of a user who uses the electronic card 20 while attaching the electronic card 20 to a portable terminal, and the coating layer 24 is  
15 provided in the outer portion of the electronic card 20 to print an image advertisement of a credit card company thereon. The user can freely apply a double-sided adhesive to a random position of the portable terminal 10 and then apply the electronic card 20 to the double-sided adhesive.

          With reference to Fig. 2, the usage of the electronic card attached to the  
20 outer face of a battery assembled onto the back face of the portable terminal 10 is now explained.

          First, when the user brings the portable terminal 10 with the electronic card 20 attached to a certain position on the battery of the portable terminal 10 to a card reader 2 mounted on a public transportation means such as a subway train or  
25 bus, the card reader 2 generates a certain radio frequency, for example, 13.56MHz, and transmits the same.

          The electronic card 20 generates electric energy through the loop antenna of the card 20 to be able to communicate with the card reader 2, reads user identification information stored in the electronic chip 23 connected to the loop  
30 antenna, and transmits the user identification information at the request of the card reader 2.

The card reader 2 adjusts a transportation fee on the basis of user identification information detected by the communication with the electronic chip 23 of the electronic card 20. Such information of adjusted transportation fee and user identification is transmitted immediately or later to a server 4 or the recording media of a financial institution through a communication means 3. The financial institution that manages the server 4 may charge the user the adjusted transportation fee at a due date after a certain period of time.

The electronic card 20 is used as a petty-settlement means so as to pay the price of a product or service fees, and usable areas can include gas stations, supermarkets, bookstores, teahouses, catering businesses and the like.

Also, as illustrated in Fig. 3, the electronic card 20 can be used as a card key for personnel authentication in a restricted area such as research institute, government agencies and a military installation while attaching the electronic card to, for example, a PDA terminal 30.

As described above, the electronic card of the present invention includes the ferrite core 22 therein for canceling interference from electromagnetic waves and the loop antenna and electronic chip 23 positioned on the ferrite core 22, thus being capable of being attached to a portable item or terminal containing interfering material that affects electromagnetic waves.

Meanwhile, Figs. 4 and 5 show the usages of the electronic card in accordance with other embodiments of the present invention.

Referring to Figs. 4 and 5, the electronic card 200 of Fig. 4 is enclosed in a certain position of a portable terminal 100, such as a mobile phone, a PDA or an IMT-2000 terminal, that is, the front portion of portable terminal 100 or the inside of the battery assembled on the back face thereof. In more detail, the built-in type contactless electronic card 200 may be interposed between a nonmetallic material constituting the contour of the portable terminal 100 and a metallic material or device such as an electromagnetic interference (EMI) shielding material or device applied to or mounted on the inner face of the nonmetallic material.

The electronic card 200 comprises a loop antenna and electronic chip 230 for communicating with a card reader 2 mounted on a subway or bus and

transmitting user identification information stored therein at the request of the card reader 2 and a ferrite core 220 composed of iron oxide ( $\text{Fe}_2\text{O}_4$ ) and an oxide of metal such as Mn, Zn, or the like for canceling interference from electromagnetic waves and a magnetic field while the card is read.

5           The electronic card 200 can be also used while being attached to an electronic notebook, a portable computer and a wristwatch.

          The electronic card 200 is enclosed in a certain position of the portable terminal 100. The electronic card 200 comprises a coating layer 210, a ferrite core 220 positioned on the coating layer 210 to cancel interference from the  
10       electromagnetic waves and magnetic field, a loop antenna and electronic chip 230 positioned on the ferrite core 200, and an adhesive layer 240 formed on the loop antenna and electronic chip 230, if necessary. In this case, the electronic card 200 is enclosed in the portable terminal 100 between a nonmetallic material constituting the contour of the portable terminal 100 and a metallic material or  
15       device such as an EMI shielding material or device applied to or mounted on the inner face of the nonmetallic material.

          Fig. 5 shows a usage of a contactless type electronic card enclosed in a PDA terminal in accordance with still another embodiment of the present invention. Fig. 6 shows a usage of a contactless electronic card enclosed in the  
20       front portion of the folder of a folder type portable terminal 100 in accordance with a further embodiment of the present invention.

          As described above, the electronic card of the present invention comprises the ferrite core for canceling interference from electromagnetic waves and a magnetic field, the loop antenna and electronic chip positioned on the ferrite core.  
25       The electronic card is interposed between the nonmetallic material constituting the contour of the portable terminal or portable item and the EMI shielding material or device applied to or mounted on the nonmetallic material.

#### Industrial Applicability

As described above, the present invention provides a contactless



electronic card with a ferrite core for canceling interference from electromagnetic waves and a magnetic field, which allows the electronic card to be used while being attached to a portable item such as a portable terminal, thereby improving the portability and convenience thereof and minimizing the risk of loss thereof.

5           Further, the present invention provides a contactless electronic card with a ferrite core for canceling interference from electromagnetic waves and a magnetic field, which allows the electronic card to be used while being disposed between the nonmetallic material constituting the contour of the portable terminal or portable item and the EMI shielding material or device applied to or mounted on the  
10 nonmetallic material, thereby improving convenience of use.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

15

Claims

1. A contactless electronic card attachable to a certain position of a portable item or portable terminal, comprising:

a loop antenna for communicating with a card reader;

5 an electronic chip for transmitting user identification information stored therein at the request of the card reader; and

a ferrite core for canceling interference from electromagnetic waves and a magnetic field while the card is read by the card reader.

2. The contactless electronic card in accordance with claim 1, wherein  
10 said electronic card is used while being attached to a certain position of a battery of the portable terminal.

3. The contactless electronic card in accordance with claim 1, wherein said electronic card functions as a means for petty-settlement.

4. The contactless electronic card in accordance with claim 1, wherein  
15 said electronic card functions as a card key for personnel authentication in a restricted area.

5. The contactless electronic card in accordance with claim 1, further comprising,

20 an adhesive layer formed on the back face of the ferrite core so as to allow the electronic card to be attached to a position on the portable item or portable terminal, and

a coating layer coated on the front face of the loop antenna and electronic chip and printed with an image advertisement,

25 wherein said loop antenna and electronic chip is positioned on said ferrite core.

6. The contactless electronic card in accordance with claim 1, further comprising,

a two-sided adhesive layer formed on the back face of the ferrite core so as to allow the electronic card to be attached to a position on the portable item or portable terminal, and

a coating layer coated on the front face of the loop antenna and electronic chip and printed with an image advertisement,

wherein said loop antenna and electronic chip is positioned on said ferrite core.

7. A contactless electronic card interposed between a nonmetallic material constituting the contour of a portable item or portable terminal and an electromagnetic interference (EMI) shielding material or device applied to or mounted on the inner face of the nonmetallic material, comprising:

a loop antenna for communicating with a card reader;

an electronic chip for transmitting user identification information stored therein at the request of the card reader; and

a ferrite core for canceling interference from electromagnetic waves and a magnetic field while the card is read by the card reader.

8. The contactless electronic card in accordance with claim 7, wherein said electronic card used as a means for petty-settlement.

9. The contactless electronic card in accordance with claim 7, wherein said electronic card is used as a card key for personnel authentication in a restricted area.

10. The contactless electronic card in accordance with claim 7, further comprising,

an adhesive layer formed on the back face of the ferrite core so as to allow the electronic card to be enclosed in a position of the portable item or portable

terminal,

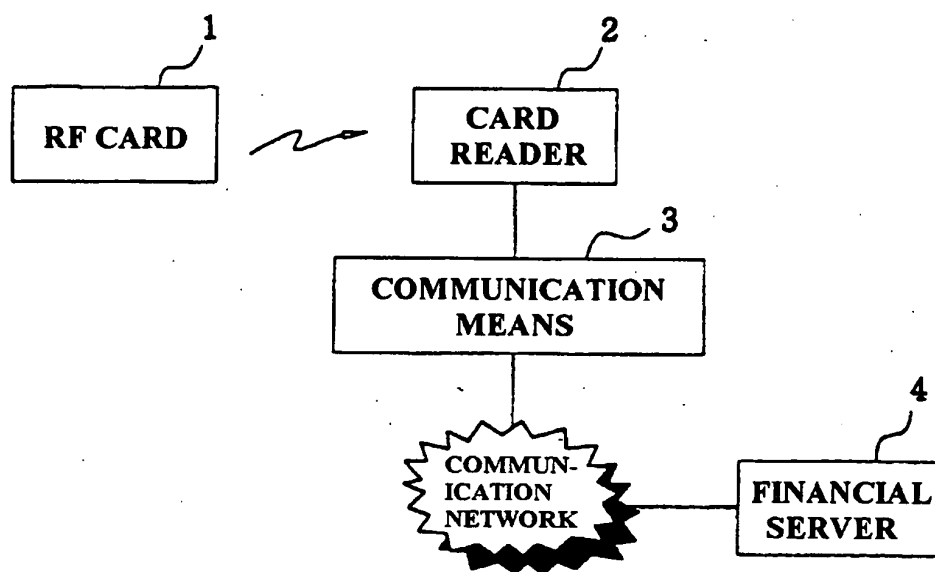
a coating layer coated on the front face of the loop antenna and electronic chip and printed with an image advertisement,

wherein said loop antenna and electronic chip is positioned on said ferrite

5 core.

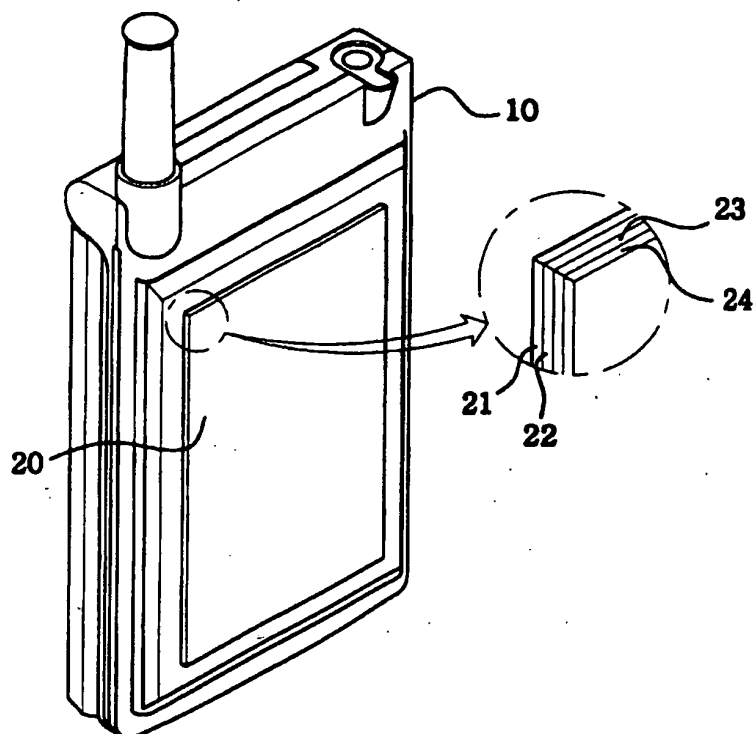
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Fig. 1



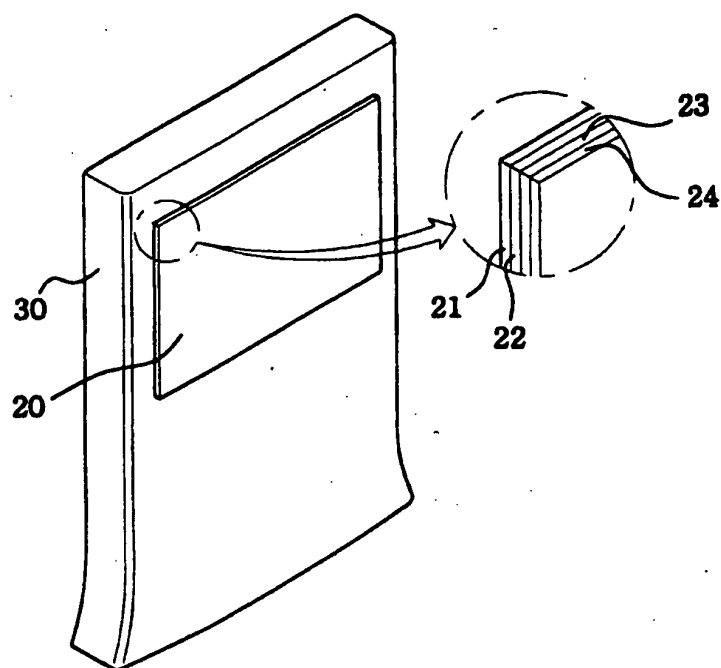
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Fig. 2



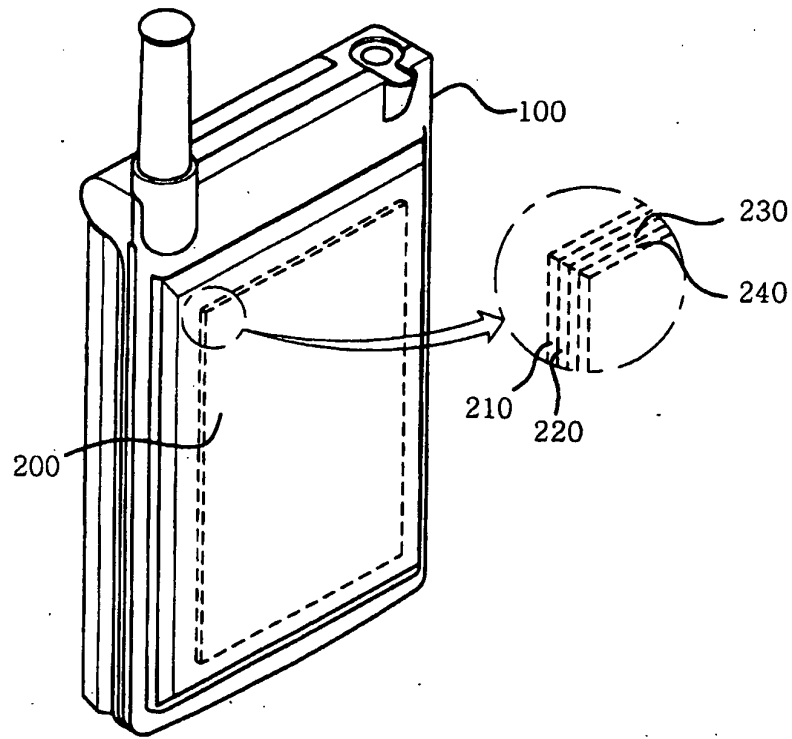
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Fig. 3



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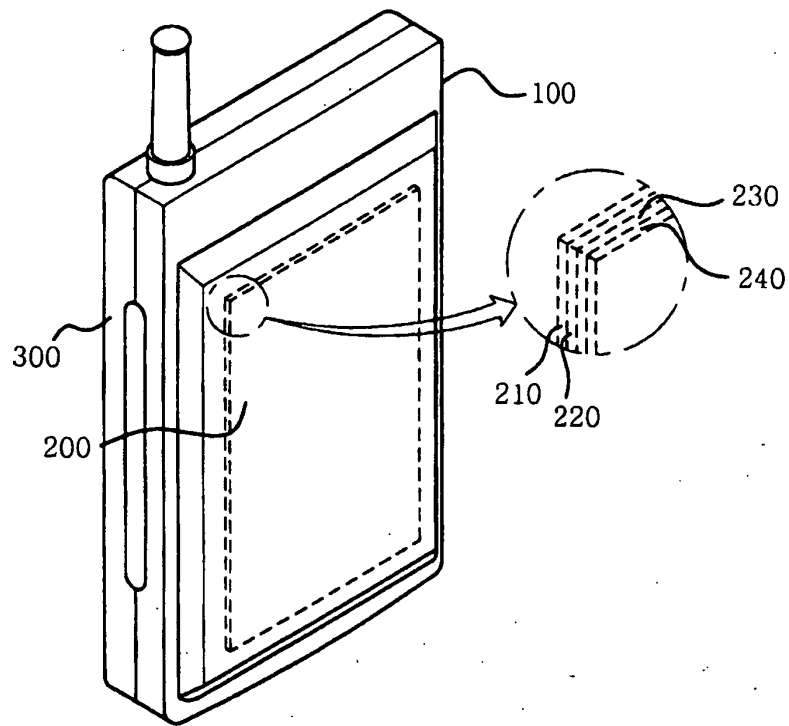
Fig. 4





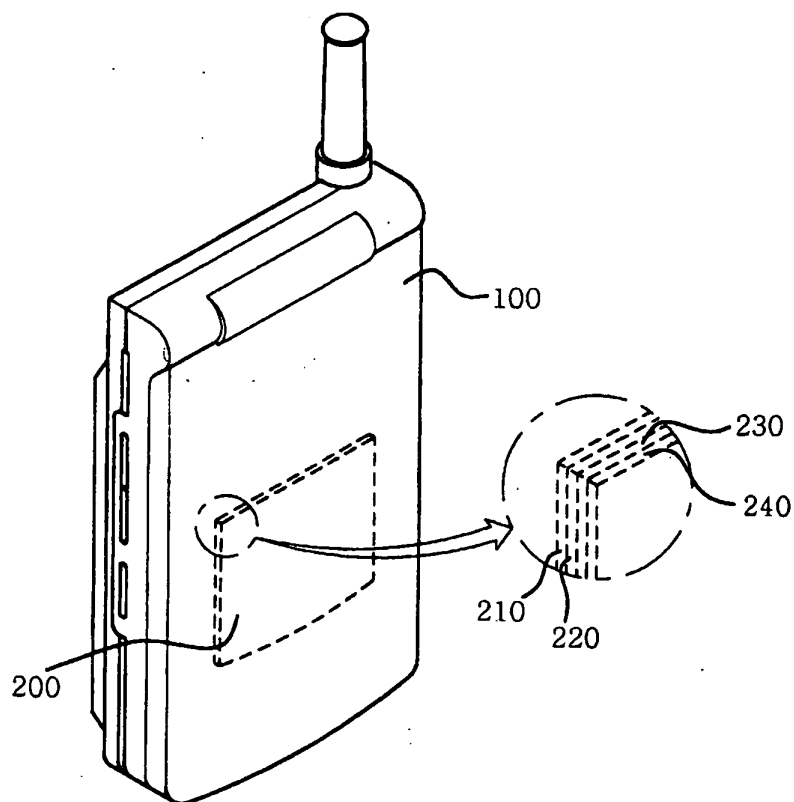
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Fig. 5



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Fig. 6



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

PCT/KR01/02299

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR20-2000-198305Y1	02.10.2000	NONE	
KR10-2000-36744A	05.07.2000	NONE	
WO1998-38120A	03.09.1998	JP10240880A2 EP962407A1 AU739643B2	11.09.1998 08.12.1999 08.10.2001

Form PCT/ISA/210 (patent family annex) (July 1998)

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR01/02299

**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 G06K 19/07**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

(IPC7) G06K, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean patent(utility model) and application for invention(utility model) since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

KIPONET

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR20-2000-198305Y1(Park, Junho) 02.October, 2000 See the whole document	1-10
Y	KR10-2000-36744A (Jo, Inho) 05. July, 2000 See the abstract and figure 9.	1-10
A	WO1998-38120A(ROHM Co. LTD.) 03. September, 1998 See the abstract	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

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